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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/936,074	09/05/2001	Ilan D. Haber	185/02360	7853

26418 7590 11/03/2004

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EXAMINER	
LI, SHI K	

ART UNIT	PAPER NUMBER
2633	

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/936,074	HABER ET AL.	
	Examiner	Art Unit	
	Shi K. Li	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 September 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *187-246* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *187-246* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 September 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. FIGs. 7A, 7B, 9 and 10 are objected to under 37 CFR 1.84(o) because there are no descriptive legends for the boxes. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 191 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 191 recites the limitation "the momentary power" in line 1 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 187-189, 195-200, 204, 207-208, 210-211, 214, 217-218, 220, 222 and 229 are rejected under 35 U.S.C. 103(a) as being unpatentable over Javitt et al. (U.S. Patent 6,031,648) in view of Heidemann (U.S. Patent 5,335,109).

Regarding claims 187, 217 and 224, Javitt et al. teaches in FIG. 1 an optical space communication system comprising a transmitter 70 for sending light beam 72 over free space (e.g., the earth's atmosphere), and a receiver 80 for receiving the light beam. Javitt et al. includes in FIG. 1 automatic gain control (AGC) 150 with variable amplification. The differences between Javitt et al. and the claimed invention are (a) Javitt et al. does not teach to direct a received beam into a fiber, and (b) Javitt et al. controls the signal in the electrical domain. It is well known in the art that AGC can be done in optical domain. For example, Heidemann teaches in FIG. 1 an optical receiver with an optical pre-amp 10 whose amplification or attenuation is variable under control of AGC 7. Heidemann also teaches in FIG. 1 an erbium-doped fiber (EDF) 3. Heidemann suggests in col. 1, line 42 that the optical amplifier can provide gain or attenuation. One of ordinary skill in the art would have been motivated to combine the teaching of Heidemann with the optical space communication system of Javitt et al. because processing signal in optical domain has the advantages of large bandwidth, large dynamic range, high sensitivity and immunity to overloading photodetector. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to control the amplification or attenuation in optical domain, as taught by Heidemann, in the optical space communication system of Javitt et al. because processing signal in optical domain has the advantages of large bandwidth, large dynamic range, high sensitivity and immunity to overloading photodetector.

Regarding claims 188-189, Heidemann teaches in col. 1, line 14 that amplitude variation can be due to temperature.

Regarding claims 195-196, Heidemann teaches in col. 2, lines 23-26 that the time constant of the automatic gain control can be chosen so as to optimize the rate at which the pump

power and, hence, the gain are readjusted. Thus, it is obvious to one of ordinary skill in the art to choose a time constant that handles variation of amplification or attenuation at a rate of 50 Hz or 1000 Hz.

Regarding claim 197, Heidemann teaches optical amplifier 10.

Regarding claims 198, 222 and 229, Heidemann teaches in col. 2, line 19-20 that the EDF may have gain less than unity. That is, the EDF may act as attenuator.

Regarding claims 199-200, Heidemann teaches to pass the received beam through a filter 6a which attenuates the amplitude by a constant gain.

Regarding claims 204, 207, 210-211 and 220, Heidemann teaches in col. 1, lines 54 that the invention can achieve a dynamic range of 80 dB.

Regarding claims 208 and 218, Heidemann teaches in col. 2, lines 23-26 that the time constant of the automatic gain control can be chosen so as to optimize the rate at which the pump power and, hence, the gain are readjusted. Thus, it is obvious to one of ordinary skill in the art to choose a time constant that handles variation of amplification or attenuation at a rate of 1000 Hz.

Regarding claim 214, Heidemann teaches in col. 2, line 19-20 that the EDF may have gain less than unity. That is, the EDF may act as attenuator.

7. Claim 190 is rejected under 35 U.S.C. 103(a) as being unpatentable over Javitt et al. and Heidemann as applied to claims 187-189, 195-200, 204, 207-208, 210-211, 214, 217-218, 220, 222 and 229 above, and further in view of Roberts (U.S. Patent 6,031,647).

Javitt et al. and Heidemann have been discussed above in regard to claims 187-189, 195-200, 204, 207-208, 210-211, 214, 217-218, 220, 222 and 229. The difference between Javitt et al. and Heidemann and the claimed invention is that Javitt et al. and Heidemann do not teach to

determine average power level of the received beam for amplification control. Roberts teaches in FIG. 6 a feed-forward variable attenuator. One of ordinary skill in the art would have been motivated to combine the teaching of Roberts with the modified optical space communication system of Javitt et al. and Heidemann because it prevents damage to sensitive optical element such as receiver. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to control amplification or attenuation based on power level of received beam, as taught by Roberts, in the modified optical space communication system of Javitt et al. and Heidemann because it prevents damage to sensitive optical element such as receiver.

8. Claims 191-194, 215, 221, 233 and 236 are rejected under 35 U.S.C. 103(a) as being unpatentable over Javitt et al. and Heidemann as applied to claims 187-189, 195-200, 204, 207-208, 210-211, 214, 217-218, 220, 222 and 229 above, and further in view of Sugawara (U.S. Patent 6,057,951).

Javitt et al. and Heidemann have been discussed above in regard to claims 187-189, 195-200, 204, 207-208, 210-211, 214, 217-218, 220, 222 and 229. Regarding claim 191, the difference between Javitt et al. and Heidemann and the claimed invention is that Javitt et al. and Heidemann do not teach determining momentary power of received beam. Sugawara teaches in FIG. 9 an optical fiber amplifier 1 with variable gain. FIG. 9 includes a peak detection circuit to detect transient surge and reduce gain of the amplifier to protect optical detector 2 from damage as illustrated in FIG. 11. One of ordinary skill in the art would have been motivated to combine the teaching of Sugawara with the modified optical space communication system of Javitt et al. and Heidemann because it suppresses transient surge to protect optical detector from damage. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was

made to detect momentary power, as taught by Sugawara, in the modified optical space communication system of Javitt et al. and Heidemann because it suppresses transient surge to protect optical detector from damage.

Regarding claims 192-193, Sugawara teaches in FIG. 9 splitter 14 at the output of optical fiber amplifier, and output level detection circuit 15.

Regarding claims 194, 215, 221 and 233, the difference between Javitt et al. and Heidemann and the claimed invention is that Javitt et al. and Heidemann do not teach to keep output light beam at a substantially constant power. Sugawara teaches in FIG. 13 an optical fiber amplifier 1 with variable gain. Sugawara teaches in FIG. 14 that output optical power is at a constant. One of ordinary skill in the art would have been motivated to combine the teaching of Sugawara with the modified optical space communication system of Javitt et al. and Heidemann because a constant power level gives the optical detector an optimal performance. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to control the amplifier to give a constant output power level, as taught by Sugawara, in the modified optical space communication system of Javitt et al. and Heidemann because a constant power level gives the optical detector an optimal performance.

Regarding claim 236, Heidemann teaches in col. 2, lines 23-26 that the time constant of the automatic gain control can be chosen so as to optimize the rate at which the pump power and, hence, the gain are readjusted. Thus, it is obvious to one of ordinary skill in the art to choose a time constant that handles variation of amplification or attenuation at a rate of 1000 Hz.

9. Claims 201-203 are rejected under 35 U.S.C. 103(a) as being unpatentable over Javitt et al. and Heidemann as applied to claims 187-189, 195-200, 204, 207-208, 210-211, 214, 217-218, 220, 222 and 229 above, and further in view of Dodley et al. (U.S. Patent 5,966,229).

Javitt et al. and Heidemann have been discussed above in regard to claims 187-189, 195-200, 204, 207-208, 210-211, 214, 217-218, 220, 222 and 229. The difference between Javitt et al. and Heidemann and the claimed invention is that Javitt et al. and Heidemann do not teach a distance that the transmitting beam can travel. Dodley et al. teaches in col. 5, line 20 an equation for calculating attenuation of atmosphere. Dodley et al. also teaches in col. 4, line 58-59 that with appropriate laser and photodetector, distance between transmitter and receiver is typically range of 100 meters to 10 Km. One of ordinary skill in the art would have motivated to combine the teaching of Dodley et al. with the modified optical space communication system of Javitt et al. and Heidemann because the equation of Dodley et al. gives a systematical method for estimating attenuation and engineering the system. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to expect a transmitting beam, with appropriate transmitting power and receiver, to transmit over a distance of at least 1000 meters, as taught by Dodley et al., in the modified optical space communication system of Javitt et al. and Heidemann based on the equation provided by Dodley et al. because it gives a systematical method for estimating attenuation and engineering the system.

10. Claims 187, 205-206, 210, 212, 217, 219, 224-226, 240-241, 244 and 246 are rejected under 35 U.S.C. 103(a) as being unpatentable over Willebrand (U.S. Patent 6,239,888 B1) in view of Heidemann (U.S. Patent 5,335,109).

Regarding claims 187, 210, 217, 224, 240 and 244, Willebrand discloses in FIG. 10 an optical space communication system with transceiver 30 for transmitting a data-carrying light beam through atmosphere to a remote transceiver where the light beam is received and directed into a fiber 34. FIG. 10 also includes EDFA 36 for changing the amplitude of the received beam and controller 100 for varying the amplification of the EDFA. The difference between Willebrand and the claimed invention is that Willebrand does not teach that the amplitude change comprises attenuations. Heidemann teaches in FIG. 1 an optical receiver with an optical pre-amp 10 whose amplification or attenuation is variable under control of AGC 7. Pre-amp 10 includes a fiber 3. Heidemann suggests in col. 1, line 42 that the optical amplifier can provide gain or attenuation. One of ordinary skill in the art would have motivated to combine the teaching of Heidemann with the optical space communication system of Willebrand because photodetectors are sensitive and can be damaged by optical power if received beam power is too strong. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to attenuate beam power if it is too strong, as taught by Heidemann, in the optical space communication system of Willebrand because photodetectors are sensitive and can be damaged by optical power if received beam power is too strong.

Regarding claims 205, 212, 219, 225 and 241, Willebrand teaches in col. 8, lines 19-22 that the light beam carries data in plurality of distinct wavelengths.

Regarding claim 206, Willebrand further teaches in col. 10, lines 41-44 to use a single mode fiber for the EDFA.

Regarding claims 226 and 246, Heidemann teaches in col. 2, lines 23-26 that the time constant of the automatic gain control can be chosen so as to optimize the rate at which the pump power and, hence, the gain are readjusted.

11. Claims 209, 216, 223, 230 and 245 are rejected under 35 U.S.C. 103(a) as being unpatentable over Willebrand and Heidemann as applied to claims 187, 205-206, 210, 212, 217, 219, 224-226, 240-241, 244 and 246 above, and further in view of Masuda et al. (H. Masuda et al., "Wideband, Gain-Flattened, Erbium-doped Fiber Amplifiers with 3dB Bandwidths of > 50 nm", Electronics Letters, Vol. 33, No. 12, 5th June 1997).

Willebrand and Heidemann have been discussed above in regard to claims 187, 205-206, 210, 212, 217, 219, 224-226, 240-241, 244 and 246. The difference between Willebrand and Heidemann and the claimed invention is that Willebrand and Heidemann do not teach a bandwidth of at least 40 nm. Masuda et al. discloses in FIG. 1 an EDFA with a bandwidth of at least 50 nm. One of ordinary skill in the art would have been motivated to combine the teaching of Masuda et al. with the modified optical space communication system of Willebrand and Heidemann because an EDFA with wider bandwidth can accommodate more wavelength channels. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the EDFA of Masuda et al. in the modified optical space communication system of Willebrand and Heidemann because an EDFA with wider bandwidth can accommodate more wavelength channels.

12. Claims 213, 227-228, 233, 237 and 242-243 are rejected under 35 U.S.C. 103(a) as being unpatentable over Willebrand and Heidemann as applied to claims 187, 205-206, 210, 212, 217,

219, 224-226, 240-241, 244 and 246 above, and further in view of Sugawara (U.S. Patent 6,057,951).

Willebrand and Heidemann have been discussed above in regard to claims 187, 205-206, 210, 212, 217, 219, 224-226, 240-241, 244 and 246. The difference between Willebrand and Heidemann and the claimed invention is that Willebrand and Heidemann do not teach providing for each distinct wavelength of beam with substantially constant amplitude. Sugawara teaches in FIG. 13 an optical fiber amplifier 1 with variable gain. Sugawara teaches in FIG. 14 that output optical power is at a constant. One of ordinary skill in the art would have been motivated to combine the teaching of Sugawara with the modified optical space communication system of Willebrand and Heidemann because a constant power level gives the optical detector an optimal performance. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to control the amplifier to give a constant output power level for each distinct wavelength, as taught by Sugawara, in the modified optical space communication system of Willebrand and Heidemann because a constant power level gives the optical detector an optimal performance.

13. Claims 224 and 231-232 are rejected under 35 U.S.C. 103(a) as being unpatentable over Willebrand (U.S. Patent 6,239,888 B1).

Willebrand discloses in FIG. 4 an optical repeater for space communication comprising a receiver 32 for receiving a data-carrying light beam, an erbium doped fiber amplifier (ERDA or EDFA). The difference between FIG. 4 and the claimed invention is that FIG. 4 does not teach variable amplification or attenuation. Willebrand discloses in FIG. 10 a transceiver with a controller for controlling transmitting power. Willebrand teaches in col. 13, lines 40-53 to use a

controller to adjust power level for station with which it communicates. The adjustment compensates for variation due to changing atmosphere conditions. One of ordinary skill in the art would have been motivated to combine the teaching of FIG. 10 of Willebrand with FIG. 4 of Willebrand because varying the amplification or attenuation to overcome changing atmosphere conditions gives a constant and optimum power transmission level for the station with which the repeater communicates. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to varying amplification or attenuation of EDFA via a controller, as taught by FIG. 10 of Willebrand, in the optical repeater of FIG. 4 of Willebrand because varying the amplification or attenuation to overcome changing atmosphere conditions gives a constant and optimum power transmission level for the station with which the repeater communicates.

14. Claims 234-235 are rejected under 35 U.S.C. 103(a) as being unpatentable over Willebrand, Heidemann and Sugawara as applied to claims 213, 227-228, 233, 237 and 242-243 above, and further in view of Masuda et al. (H. Masuda et al., "Wideband, Gain-Flattened, Erbium-doped Fiber Amplifiers with 3dB Bandwidths of > 50 nm", Electronics Letters, Vol. 33, No. 12, 5th June 1997).

Willebrand, Heidemann and Sugawara have been discussed above in regard to claims 213, 227-228, 233, 237 and 242-243. The difference between Willebrand, Heidemann and Sugawara and the claimed invention is that Willebrand, Heidemann and Sugawara do not teach a bandwidth of at least 40 nm. Masuda et al. discloses in FIG. 1 an EDFA with a bandwidth of at least 50 nm. One of ordinary skill in the art would have been motivated to combine the teaching of Masuda et al. with the modified optical space communication system of Willebrand, Heidemann and Sugawara because an EDFA with wider bandwidth can accommodate more

wavelength channels. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the EDFA of Masuda et al. in the modified optical space communication system of Willebrand, Heidemann and Sugawara because an EDFA with wider bandwidth can accommodate more wavelength channels.

15. Claims 238 and 239 are rejected under 35 U.S.C. 103(a) as being unpatentable over Willebrand, Heidemann and Sugawara as applied to claims 213, 227-228, 233, 237 and 242-243 above, and further in view of Jackel (U.S. Patent 6,175,436 B1).

Willebrand, Heidemann and Sugawara have been discussed above in regard to claims 213, 227-228, 233, 237 and 242-243. The difference between Willebrand, Heidemann and Sugawara and the claimed invention is that Willebrand, Heidemann and Sugawara do not teach a saturated optical amplifier. Jackel teaches in col. 3, lines 4-14 that it is desirable to operate an EDFA in saturation due to signal-to-noise ratio consideration and clamped output level. One of ordinary skill in the art would have been motivated to combine the teaching of Jackel with the modified optical space communication system of Willebrand, Heidemann and Sugawara because of the said advantages. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to operate a EDFA in saturation, as taught by Jackel, in the modified optical space communication system of Willebrand, Heidemann and Sugawara because it gives better signal-to-noise ratio and clamps output power at a fixed level.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 571 272-3031. The examiner can normally be reached on Monday-Friday (8:30 a.m. - 5:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

skl
26 October 2004

M. R. Sedighian
M. R. SEDIGHIAN
PRIMARY EXAMINER